Recommended USB 3.0 System Components

Technical Application Note TAN2011005
Revised January 14, 2014

1.1. Subject

Technical Application Note (TAN2011005): Recommended USB 3.0 System Components

1.2. Applicable Product(s)

- All USB 3.0 imaging devices

1.3. Application Note Description

This Technical Application Note provides an overview of tests conducted by Point Grey on various hardware and driver components that are necessary for operating USB 3.0 cameras. Configurations that are recommended are provided for the following components:

- CPU, Motherboard, and Chipset
- Host Controller Interface (HCI) Card and Driver
- Cables, Hubs and Operating System
- Grasshopper3 USB 3.0 Configuration

Additionally, a list of suggestions for troubleshooting is provided.

1.4. CPU, Motherboard, and Chipset

1.4.1. Recommended Configurations

Point Grey tested the following motherboard, CPU and chipset configurations and found they provide optimal color processing performance and full x1 PCIe 2.0 speed for USB 3.0 imaging.

CPU	Motherboard	Chipset
Intel Core i7	ASUS P8P67	Intel P67 (B3)
Intel Core i7	ASUS P6T	Intel X58/ICH10R
Phenom II X6	ASUS M4A89GTD PRO/USB3	AMD 890GX/SB850
Intel Core i5-2400	ASUS P8Z68-V-PRO	Intel Z68
Intel Core i7	Intel DH67CL	Intel H67 Express
Intel Core i7	Intel DH61BEB3	Intel H61 Express
Intel Core i3-2100	Intel BLH6710H.86A	Intel H67 Express
Intel Core i7	GIGABYTE GA-P67A-UD3-B3	Intel P67

Table 1: Tested USB 3.0 Motherboard, CPU and Chipset Configurations

While Point Grey has not tested every possible configuration, motherboards with Intel i series or AMD CPUs and associated chipsets are expected to support USB 3.0 without issues.

PGR, the Point Grey Research, Inc. logo, FlyCapture, Digiclops, Dragonfly, Dragonfly Express, Chameleon, Firefly, Flea, Ladybug, Zebra, Scorpion and Triclops are trademarks or registered trademarks of Point Grey Research, Inc. in Canada and other countries. Copyright © 2011-2014 Point Grey Research, Inc. All rights reserved.

Motherboard and CPU can be identified in the Windows System Information tool. For example, in Windows 7, the motherboard make and model are labeled 'System Manufacturer' and 'System Model.' (In general, the motherboard make and model also determine the chipset.) The CPU is identified under 'Processor.'

1.4.2. Unsupported Configurations

Point Grey tested the following motherboard, CPU and chipset configurations and found sufficient issues to make them undesirable for USB 3.0 imaging.

CPU	Motherboard	Chipset	Reason
Intel Core i7 Intel Core i5 Intel Core i3	Intel DH55HC	Intel H55 Express	Unable to achieve 500 MB/s for running two cameras.
Intel Pentium Dual Core E5300	ASUS P5QL/EPU	Intel P43/ICH10	Connection failures with Renesas (NEC) xHCI adapter.
Intel Core2 Quad	ASUS P5QL PRO	Intel P43/ICH10	Connection failures.
Intel Core2 Duo E7400	Gigabyte EP43-DS3L		Connection failures.

Table 2: USB 3.0 Unsupported Motherboard, CPU and Chipset Configurations

1.4.3. Test Specifications

Motherboard tests used two Point Grey cameras connected to a single USB 3.0 card installed in an x1 PCIe slot, streaming at a combined bandwidth of at least 240 MB/s. Both cameras were configured to use the Point Grey PGRxHCI driver. One camera ran 1920 x 1080 at 60 FPS RAW8; the other camera ran 1280 x 1024 at 125 FPS Mono8. Both cameras ran overnight to ensure that high bandwidth was sustained and no other driver or motherboard issues appeared.

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.

1.5. Host Controller Interface (HCI) Card and Driver

Point Grey tested different USB 3.0 HCI cards in conjunction with the Point Grey PGRxHCI driver (pgrxhci.sys) and drivers provided by the manufacturer. In general, Point Grey's driver resulted in fewer issues than using the manufacturer's driver. Drivers provided by the manufacturer must be used in conjunction with the Point Grey PGRUSBCam driver.

To determine the driver currently in use by the xHCI card, use the Windows Device Manager. For example, in Windows 7, open the properties window of the adapter, click the **Driver** *tab, then click* **Driver Details***.*

1.5.1. Recommended Configurations

xHCI Adapter	Driver	Version (or later)
Fresco FL1100EX (Sold by Point Grey – Part Number ACC-01-1202)	PGRxHCI	2.3.3.40
	Fresco/PGRUSBCam	3.5.24.0/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
Renesas (NEC) µPD720202 (Sold by Point Grey – Part Number ACC-01-1201)	PGRxHCI	2.3.3.40
	Renesas (NEC)/ PGRUSBCam	3.0.23.0/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
Renesas (NEC) µPD720201	PGRxHCI	2.3.3.40
	Renesas (NEC)/ PGRUSBCam	3.0.23.0/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
Renesas (NEC) µPD720200A	PGRxHCI	2.3.3.40
	Renesas (NEC)/ PGRUSBCam	2.1.39.0/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
Fresco FL1009	PGRxHCI	2.3.3.40
	Fresco/PGRUSBCam	3.5.24.0/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
AMD	PGRxHCI	2.3.3.40
	AMD/PGRUSBCam	1.0.0.55/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38
Intel	Intel/PGRUSBCam	1.0.5.235/2.3.3.38
	Microsoft Windows8 USB3 driver/PGRUSBCam	2.3.3.38

Table 3: USB 3.0 Supported xHCI Adapter and Driver Configurations

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.

We recommend always using the latest version of the driver.

1.5.2. Unsupported Configurations

xHCI Adapter	Driver	Version	Reason
Fresco FL1000	PGRxHCI	All	Insufficient testing
Fresco FL1000	Fresco + PGRUSBCam	3.0.110.12	Insufficient testing
ASMedia	PGRxHCI	All	Not yet supported
Etron	Etron or Point Grey	All	Not yet supported
TI	PGRxHCI	All	Not yet supported
Via	PGRxHCI	All	Not yet supported

Table 4: USB 3.0 Unsupported xHCI Adapter and Driver Configurations

1.6. Cables, Hubs and Operating System

1.6.1. Recommended Cables

The USB 3.0 standard does not specify a maximum cable length.

- 3-meter USB 3.0 cable (Sold by Point Grey – Part Number ACC-01-2300)
- 5-meter USB 3.0 cable (Sold by Point Grey – Part Number ACC-01-2301)

The 5-meter cable is not recommended for laptops or on board controllers.

1.6.2. Recommended Hubs

Point Grey recommends using hubs that have been certified by the USB-IF to have passed the USB-IF Compliance Program for product quality.

Point Grey testing found that USB 3.0 hubs with chipsets manufactured by Texas Instruments and Via 811+ provided the best image streaming results, followed by the Genesys Logic.

Hubs were tested in conjunction with a Renesas (NEC) xHCI adapter and the PGRxHCI driver.

- 4-port USB 3.0 hub with power supply Texas Instruments chipset (Sold by Point Grey – Part Number ACC-01-6000)

For more information on setting up multiple USB 3.0 cameras, see Knowledge Base Article 389.

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.

Although the effective USB 3.0 bandwidth is approximately 450 MByte/s, peak performance using a hub has been tested to be significantly lower.

1.6.3. Recommended Operating Systems

Point Grey recommends using USB 3.0 cameras on Windows 7, Window 8, or Linux Ubuntu 12.04.02. For more information on using Linux with USB 3.0 see Knowledge Base Article 395.

Ladybug5 cameras are not supported on Linux.

1.7. Grasshopper3 USB 3.0 Configuration

To optimally support the Grasshopper3 USB 3.0 camera, recommended system components are:

Component	Description
CPU	Intel(R) Core(TM) i7-2600K or equivalent
RAM	4 GB
Host Adapter/ Host Controller	Renesas Electronics µPD720202 (Part Number ACC-01-1201 sold by Point Grey) Or Fresco Logic FL1100 (Part Number ACC-01-1202 sold by Point Grey) Or Intel® USB 3.0 eXtensible Host Controller
Cabling	3 meter (Part Number ACC-01-2300 sold by Point Grey)
Operating System	Windows 7 SP1 (x64 or x86)
Driver	PGRxHCI 2.3.3.54 or later
Software	FlyCapture 2.5.2.3 or later
Firmware	v1.10.3.0 or later

Testing has shown that some host adapters are **not** able to achieve maximum frame rate with some Grasshopper3s, including:

- Fresco Logic FL1009 (Part Number U3-PCIE2-2P01 sold by Point Grey)
- Renesas Electronics µPD720200 (Part Number ACC-01-1200 no longer sold by Point Grey)

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.

1.8. Troubleshooting Issues

The following suggestions may help you troubleshoot issues with your USB 3.0 camera:

1. Update the driver to the latest version.
2. Update the firmware to the latest version.
3. Update the FlyCapture SDK to the latest version.
4. Perform a soft reboot and if still necessary a hard reboot of the PC.
5. Disable then enable the driver.
6. Power cycle the camera.
7. Power the camera through GPIO, if wiring harness is available.
8. Use a separate host controller instead of an integrated one, if available.
9. Ensure the card is powered via the 4-pin hard drive connector, if applicable.
10. Use a different cable or host controller or PC.

Updated software and firmware is available from the Point Grey Downloads page. Please read the release notes that accompany the updates.

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.

1.9. Additional Downloads and Support

Point Grey Research Inc. endeavors to provide the highest level of technical support possible to our customers. Most support resources can be accessed through the Support section of our website.

Creating a Customer Login Account

The first step in accessing our technical support resources is to obtain a Customer Login Account. This requires a valid name and email address. To apply for a Customer Login Account go to the Downloads page.

Knowledge Base

Our Knowledge Base contains answers to some of the most common support questions. It is constantly updated, expanded, and refined to ensure that our customers have access to the latest information.

Product Downloads

Customers with a Customer Login Account can access the latest software and firmware for their cameras from our Downloads page. We encourage our customers to keep their software and firmware up-to-date by downloading and installing the latest versions.

Contacting Technical Support

Before contacting Technical Support, have you:
1. *Read the product documentation and user manual?*
2. *Searched the Knowledge Base?*
3. *Downloaded and installed the latest version of software and/or firmware?*

If you have done all the above and still can't find an answer to your question, contact our Technical Support team.

Copyright © 2011–2014 Point Grey Research, Inc. All rights reserved.